Transport in plants

Mark Scheme

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Transport in plants
Sub-Topic	
Paper Type	Alternative to Practical
Booklet	Mark Scheme

Time Allowed: **57 minutes**

Score: **/47**

Percentage: **/100**

<table>
<tr>
<td>1 (a (i)</td>
<td>Possession of outer layer / skin / rind / bark / have layers / ‘roundish’ shape / cortex;</td>
<td>[1]</td>
<td>Ignore references to cells / colour</td>
</tr>
<tr>
<td>(ii)</td>
<td>Three differences from:
<table>
<tr><th>difference</th><th>stem</th><th>lotus stem</th></tr>
<tr><td>shape</td><td>irreg / oval / random / AW</td><td>round / circular/ cylindrical / symmetrical / AW;</td></tr>
<tr><td>cavities / holes / gaps / pores / pipes / air spaces</td><td>none / compact</td><td>cavities present / arranged in circle / porous / AW;</td></tr>
<tr><td>inner layer</td><td>fibrous / fibres / hair like</td><td>holes / gaps present / AW;</td></tr>
<tr><td>outer layer / bark / skin / wall</td><td>dark / thick / rough</td><td>light / thin / smooth / not visible / AW;</td></tr>
<tr><td>colour</td><td>uniform</td><td>dark patches / AW;</td></tr>
<tr><td>AW;</td><td></td><td></td></tr>
</table></td>
<td>[3]</td>
<td>Accept comparative answers in one box only
If answers are in one box only, they must be comparative
Ignore references to phloem and xylem</td>
</tr>
<tr>
<td>(b)</td>
<td>Feature [1] + linked explanation [1]
<table>
<tr><td>holes / vessels / tubes / AW;</td><td>floatation / buoyancy / gas filled / gas exchange/ AW;</td></tr>
<tr><td>cylindrical / bends / flexibility;</td><td>resist currents / prevents damage;</td></tr>
<tr><td>smooth / surface area less;</td><td>Less pressure from water;</td></tr>
</table></td>
<td>Max [2]</td>
<td>‘Gas filled holes helps them to float’ = 2 marks</td>
</tr>
</table>

(c)	**Four marks from:** **1.** cut (thin) section / piece of lotus root / grind / dissect / blend / mash / rub / layer of cells; **2.** place on microscope slide / glass slide / slide / glass / slab; **3.** stain with iodine <u>solution</u>; **4.** cover slip used / AW; **5.** look for blue / black stained grains / granules / spots / areas; **6.** AVP;	**MAX [4]**	**Ignore** heating and use of ethanol. **3. Acce** drops of iodine or iodine in KI. **5. Accept** 'darker' for 'black' **6.** e.g. use blotting paper to mop up excess liquid
		[Total: 10]	

Question	Answer	Comments
2 (a) (i)	description of curvature in 0.8M; description of curvature in 0.0M; [2]	for 0.8M **A** first / left ; for 0.0M **A** second / right; **A** curve / bends; outer layer; inner layer **0.8M** inwards; outside / convex; inside / concave/ shrunk / shrink; hollow in **0.0M** outwards; inside / concave; outside/convex/ expanded; hollow out ***I*** *thicker wall* ; *thinner wall*
(ii)	1 <u>osmosis</u> 2 loss of water / exosmosis in 0.8 molar salt solution; 3 reference to (cells)shrinking / becoming flaccid / plasmolysed; 4 increase in water / endosmosis in 0.0 molar; 5 reference to (cells) swelling / becoming turgid; 6 definition of osmosis (must refer to gradient and sp membrane); 7 wax / waterproof layer / impermeable; [MAX 4]	**R** salt movement Points 2 + 3 and points 4 + 5 are linked **A** water conc. / salt conc. / hyper or hypo tonic in a correct context **A** salt solution. – as reference to 0.8 molar
(b)	1 range of salt solutions / different concs; 2 same time; 3 same plant / type / species / dandelion; 4 same size / length / mass at start; 5 measure curvature / no change (in mass / curvature); 6 plot graph of conc against change in length; 7 repeat (experiment / more stems per conc); [MAX 4]	Points 1 and 2 are not valid for 0.0M and 0.8M only, need 3 **A** 30 mins minimum **I** temp / conditions **I** reference to control
	[Total: 10]	

3.

Mark (b)(ii) first but record mark in margin on page 3

(a) (shade in all of the central xylem; **[if other tissues are shaded – these must include the piliferous layer NOT the phloem]**

shade in the innermost half of **all** vascular bundles; **[2]**

(ii) xylem; **[no ecf] [if more than one tissue is named = 0] [ignore 'vessels']** **[1]**

(b) (root hair/root hair cells/reject hair roots; **[1]**

(ii) correct arrow indicating 'end of root'; **[if no arrow check on Fig.1.2]** **[1]**

(c) use numbers by ticks to indicate point awarded.

1 same age(of shoot)/similar shoot/same number of leaves/same mass/weight; **[ignore same length – insufficient]**

2 same species/same type;

3/4 same temperature/warmth/light/wind/humidity ;;

or same conditions = 1 (*2* possible marks for *identified* conditions)

5 same apparatus/set-up/concentration of dye in container;

6 same volume/amount of liquid/water;

7 same time [**A** mins, hours, days – even few hours if applies to both set-ups];

8 repeats;

9 method of measuring uptake **either** by bubble method **or** loss of coloured solution/water

or change in colour of plant;

10 AVP e.g. cutting the plant under water **or** adding oil to surface of water to prevent evaporation; **[Max: 6]**

[Total: 11]

4 **(a) (i) and (ii)** **[1] and**

concentration of glucose solution /mols dm $^{-3}$	potato pieces after being left in glucose solutions	length of potato/mm	change in length/mm
0.2		1 6 2 6 3 6	
		mean 66	+
0.4		1 65 2 61 3 63	
		mean 63	+
0.6		1 56 2 61 3 60	
		mean 59	-
0.8		1 55 2 59 3 5	
		mean 56	-
1.0		1 53 2 58 3 5	
		mean 55	-

(iii) correct value;
sign +/-; **[2]**

(iv) repeat/reliability; R. to calculate an average, increasing accuracy. **[1]**

(b) S scale to fill grid;
P + P for accurate plot including +/-;;
L for suitable clear line; **[4]**

(ii) movement of water only;
osmosis;
gradient or ref to water potential;
above/increase in length - intake of water;
below/decrease in length - loss of water;
reference to partially permeable membrane/AP;. **[Max4]**

(c) value below 0.55 mols dm^{-3} [0.54 to 0.56]. **[1]**

(ii) idea of balance with cell sap/tissue and solution balance;
water moving inwards = water moving outwards;
no net change;
ext conc equals internal conc/AW;
accept. in terms of water potential. **[2]**

TOTAL [16]